
Rubiacearum Americanarum Magna Hama, Pars XVII. A New Species and Four New Combinations in Mesoamerican Rondeletieae (Rubiaceae)

David H. Lorence

National Tropical Botanical Garden, 3530 Papalina Road, Kalaheo, Hawaii 96765, U.S.A.
lorence@ntbg.org

ABSTRACT. Studies for a forthcoming treatment of Rubiaceae for the *Flora Mesoamericana* project revealed an undescribed species from Honduras and also the necessity for four new combinations in Rondeletieae. The new species *Arachnothryx nelsonii* Lorence is described from Honduras. It is related to the glabrous Mexican species *A. purpurea* (Lorence) Borhidi from which it differs in having leaves sparsely strigillose on the costa, veins, and margins, flowers with a strigillose hypanthium and calyx, white externally strigillose corollas, and subglobose capsules. In addition, the following new combinations are proposed in *Arachnothryx* and *Rogiera*: *Rondeletia myriantha* Standley & Steyermark var. *armentalis* L. O. Williams is elevated to species level as *Arachnothryx armentalis* (L. O. Williams) Lorence; *Rondeletia hondurensis* Donnell Smith is transferred to *Arachnothryx* as *Arachnothryx hondurensis* (Donnell Smith) Lorence; *Rondeletia megalantha* is transferred to *Arachnothryx* as *Arachnothryx megalantha* (Lorence) Lorence; *Rondeletia standleyana* A. R. Molina is transferred to *Rogiera* as *Rogiera standleyana* (A. R. Molina) Lorence; and *Rondeletia ovoidensis* Lundell is reduced to synonymy under *Arachnothryx armentalis*.

Key words: *Arachnothryx*, *Javorkeae*, Mesoamerica, *Rogiera*, *Rondeletia*, Rondeletieae, Rubiaceae.

As interpreted in the broad or traditional sense, *Rondeletia* s.l. comprises approximately 230 to 250 species of shrubs and small trees restricted to the tropical regions of Mexico, Central and South America, and the Antilles. However, the genus displays considerable morphological variation and has been split into segregate genera by various authors, most often utilizing morphological characters (for further discussion see Borhidi, 1982, 1987, 2001; Borhidi & Fernandez Zequeira, 1981; and Lorence, 1991). The three principal segregate genera are: *Rondeletia* s. str., comprising ca. 140 species mainly in the Antilles (four species in Mesoamerica); *Arachnothryx* Planchon with ca. 80 species ranging

from Mexico to South America; and *Rogiera* Planchon, with 18 species ranging from Mexico to Panama (Mabberley, 1997; Lorence & Taylor, in prep.). Initial cytological evidence based on investigations of two species per genus revealed base numbers of $n = 9$ for *Arachnothryx*, $n = 10, 11$ for *Rogiera*, and $n = 11, 14$ for *Rondeletia* s. str. (Kiehn, 1995).

More recently, Borhidi and collaborators have described several small segregate genera in this alliance in Mexico and Mesoamerica based on morphological criteria, including *Javorkeae* Borhidi & Járαι-Komlódi, *Rennistipula* Borhidi, and *Roveanthus* Borhidi (Borhidi & Járαι-Komlódi, 1983; Borhidi, 2003, 2004). *Rennistipula* was described to accommodate three species with reniform stipules that Borhidi had previously transferred to *Arachnothryx*: *A. costaricensis* (Standley) Borhidi, *A. galcottii* (Standley) Borhidi, and *A. izabalensis* (Standley & Steyermark) Borhidi. In addition, Borhidi (2004) described *Roveanthus* to accommodate two species he had formerly included in *Rogiera*: *R. strigosus* (Benth) Borhidi and *R. suffrutescens* (Brandege) Borhidi. Pending further molecular and phylogenetic studies covering a broad range of Rondeletieae species, I believe it is premature to recognize these new genera and prefer to retain these species in *Arachnothryx* and *Rogiera*, respectively.

Recent molecular-phylogenetic data from *trnL-F* cpDNA gene sequencing suggest that *Rondeletia* s.l. is polyphyletic, and that *Arachnothryx* and *Javorkeae* are closely related to each other and to *Gonzalagunia* Ruiz & Pavón (also Rubiaceae: Rondeletieae), but less closely so to *Rogiera* and *Rondeletia* s. str. (Rova et al., 2002). However, only a small number of species in the *Rondeletia* alliance have been sampled thus far for molecular studies; more importantly, virtually none of the critical species of *Arachnothryx* from Mexico and Central America with unusual floral and seed morphological characters that overlap the generic boundaries proposed by Borhidi and others have been sampled.

These include species such as *Arachnothryx deamii* (Donnell Smith) Borhidi and *A. hondurensis*, whose deviating characters are noted in the key below. Species comprising the segregate genera *Rennistipula* and *Roveanthus* also remain unsampled. Further cytological, morphological, phylogenetic, and molecular studies are clearly needed to satisfactorily resolve the systematics of this complex.

In light of available evidence it was decided to recognize three segregate genera in the broader *Rondeletia* alliance (i.e., *Arachnothryx*, *Rogiera*, and *Rondeletia* s. str.) for the *Flora Mesoamericana* treatment. During the course of preparing accounts of these genera, collections representing an undescribed species from Honduras were encountered. In addition, four new combinations in *Arachnothryx* and one in *Rogiera* are required. A full treatment of the Mesoamerican Rubiaceae will be given in the forthcoming treatment for *Flora Mesoamericana* by David Lorence and Charlotte M. Taylor (Lorence & Taylor, in prep.).

KEY TO THE THREE GENERA IN THE *RONDELETIA* S.L. ALLIANCE IN THE MESOAMERICAN REGION

- 1a. Lobes of calyx and corolla usually 4 (corolla lobes 5 and calyx lobes 5 to 7 in *A. hondurensis*, calyx lobes rarely 5 or 6 in *A. deamii*); corolla throat glabrous or white papillose-puberulent in and around throat, not yellow or white barbate (except in *A. hondurensis*), lacking a conspicuous fleshy ring around throat, tube internally pubescent in basal portion; capsule dehiscence loculicidal and often with some septicidal splitting; seeds usually rhomboid, square, or triangular, not winged or caudate (except fusiform and winged in *A. deamii*, narrowly winged in *A. costaricensis*, *A. galeottii*, and *A. izabalensis*), the testa usually deeply foveolate-reticulate *Arachnothryx*
- 1b. Lobes of calyx and corolla usually 5 (rarely 4 or 6 in some flowers); corolla densely yellow or white barbate in and around mouth of tube, or with a thickened fleshy ring around mouth of tube, tube glabrous within; capsule dehiscence strictly loculicidal; seeds fusiform, caudate and winged at one or both ends (*Rondeletia*), or angular to rounded or suborbicular (*Rogiera*), the testa usually shallowly foveolate-reticulate.
- 2a. Corolla with a thickened, fleshy ring around mouth of tube (also papillose or puberulent in *R. belizensis* (Donnell Smith) Lorence); seeds fusiform, caudate and winged at one or both ends (discoid with broad wing in *R. belizensis*) *Rondeletia* s. str.
- 2b. Corolla densely yellow or white barbate in and around mouth of tube; seeds angular and rounded to suborbicular, unwinged *Rogiera*

1. *Arachnothryx nelsonii* Lorence, sp. nov.
 TYPE: Honduras. Copán: Montaña Los Zapotes, mountain W of Los Zapotes, 18 km N of

Copán ruins on road to Agua Caliente from Copan ruins and 2–3 km W of Los Zapotes school, 950–1050 m, 14°58'N, 89°10'W, 30 Apr. 1996 (fl, fr), T. Hawkins 993 (holotype, MO; isotypes, BM, EAP, MEXU, PTBG). Figure 1.

Haec species *Arachnothrychi purpureae* affinis, sed ab ea lamina foliari secus costam venas marginemque parce strigillosa, hypanthio calyceque strigillosis, corolla alba extus strigillosa, atque capsula subglobosa differt.

Small trees 3–8 m tall, the leafy twigs slender, 1–1.8 mm diam., terete, glabrous, drying dark brown, wrinkled, the internodes 0.7–10 cm long. Leaves opposite, those of a pair at a node anisophyllous or subequal, one up to 50% larger than the other; lamina ovate-elliptic, elliptic, oblong-elliptic or oblanceolate-elliptic, 4–11 × 1.5–3.5 cm, the apex abruptly acuminate or caudate, the acumens 1–1.5 cm long, often falcate, the base cuneate to acute, often unequal-sided, drying membranaceous to thinly chartaceous, greenish brown, adaxially sparsely strigillose on costa and secondary veins, abaxially glabrous or sparsely strigillose on costa and veins, the secondary veins 3 to 7 pairs, arcuate, prominulous on both surfaces, eucamptodromous, the axils barbate and domatiate, the venation visible to quaternary order on both surfaces, the margins sparsely strigillose-ciliolate; petioles 2–10 mm long, 0.5–0.8 mm diam., glabrous or adaxially strigillose; stipules broadly to narrowly triangular, acuminate, 0.8–2 mm long, ca. 1 mm wide, externally sparsely strigillose, internally pilosulous. Inflorescence terminal, corymbiform-cymose, trichotomous, 3–7 × 2.5–5 cm (including the corollas), sessile or the peduncle to 3 cm long, 12- to 27-flowered, the primary branches 3, ascending, 0.8–3.4 cm long, subequal or the central one longest, unbranched or branching once again, ending in 2- to 6-flowered cymules, the axes glabrous, flattened, bracteoles 0.8–3 mm long, linear-subulate, strigillose; flowers apparently distylous, subsessile or on pedicels to 1.2 mm long, minutely bracteolate, the hypanthium ellipsoid, 1–1.2 × 0.6–0.8 mm, strigillose, the calyx limb lobed nearly to base, calyx cup 0.3 mm deep, calyx lobes 4, strigillose, unequal, 1 large and oblong or oblong-elliptic, 2–4.5 × 0.7–0.9 mm, the other 3 lobes much smaller, linear or subulate, 1–2.5 × 0.1 mm; corolla salverform, white, the tube ca. 8 mm long, 0.6–0.8 mm diam. medially, externally strigillose with ascending hairs, internally hirtellous in basal 1/3, distally glabrous, the lobes 4, oblong-elliptic, 1.2–1.5 × 1–1.2 mm, externally strigillose-setose, internally glabrous; short-styled flowers with stamens



Figure 1. *Arachnothryx nelsonii* Lorence. —a. Habit with inset showing abaxial leaf surface details. —b. Flower, with hypanthium bearing calyx lobes and style, and corolla tube opened to reveal stamens. —c. Two inflorescence cymules with flowers in bud. —d. Disintegrating capsules showing vascular bundles. —e. Seed. —f. Node with stipule. All drawn from the type, *Hawkins 993*. Scale bar 5 cm in a; 1 cm in b, c, d; 0.5 mm in e; 1 mm in f.

included, sessile, attached ca. 1 mm below apex of tube, the anthers ca. 1 mm long with style glabrous, ca. 3.5 mm long with 2 linear stigma lobes ca. 1.5 mm long; long-styled flowers not seen. Capsules subglobose, 3–4.5 mm diam., glabrate, slightly bisulcate, weakly 6- to 8-ribbed, disintegrating with age to reveal vascular bundles; seeds subglobose-angulate, 0.4–0.6 mm diam., the testa deeply reticulate, dark brown.

Distribution and habitat. Known only from the departments of Copán and Cortés in Honduras where it occurs in montane evergreen wet forest with *Liquidambar*, 950–1500 m in elevation. Collected in flower in February and April, and in fruit in April.

Etymology. This species is named for Honduran botanist Cirilo H. Nelson in recognition of his contributions to the botany of Honduras.

Arachnothryx nelsonii seems most closely related to the nearly glabrous Mexican species *A. purpurea* (Lorence) Borhidi from which it differs in having leaves sparsely strigillose on the costa, veins, and margins, flowers with a strigillose hypanthium and calyx, corolla white with an externally strigillose tube and externally strigillose-setose lobes, and subglobose capsules.

Paratype. HONDURAS. **Cortés:** Montaña de La Nive, lado SO del Caserío El Tapiquilar, 20 km S de San Antonio de Cortés, 23 Feb. 1982 (fl), C. Nelson, J. Escobar & R. Andino 8004 (MO 4324692, PTBG, UNAH).

2. *Arachnothryx armentalis* (L. O. Williams) Lorence, comb. et stat. nov. Basionym: *Rondeletia myriantha* Standley & Steyermark var. *armentalis* L. O. Williams, Phytologia 26: 127. 1973. *Arachnothryx myriantha* (Standley & Steyermark) Borhidi var. *armentalis* (L. O. Williams) Borhidi, Acta Bot. Hung. 35: 310. 1989. TYPE: Guatemala. Quiché: Nebaj, 5600 ft., 22 Nov. 1934, A. F. Skutch 1776 (holotype, F 815811, photos at MEXU, PTBG).

Rondeletia ovandensis Lundell, Wrightia 5: 326. 1976. Syn. nov. *Arachnothryx ovandensis* (Lundell) Borhidi, Acta Bot. Hung. 35: 310. 1989. TYPE: Mexico. Chiapas: Mt. Ovando near Escuintla, 24 Oct. 1941, E. Matuda 6067 (holotype, LL, photos at MEXU, PTBG; isotypes, F, LL not seen).

Williams (1973) described *Rondeletia myriantha* Standley & Steyermark var. *armentalis* (meaning "one of a crowd") based on a single flowering specimen. He believed it represented a minor variant of *Arachnothryx myriantha* (Standley & Steyermark) Borhidi, from which it differed in having leaves densely arachnoid-tomentose abaxially and flowers with a sparsely arachnoid-tomentose hypanthium and calyx limb and subequal calyx lobes. Further study of additional collections has revealed that *A. myriantha* is characterized by having leaves that are uniformly arachnoid-tomentose on both surfaces when young and soon glabrescent and its corollas externally strigillose-pilosulous, whereas variety *armentalis* differs in having leaves adaxially persistently hirtellous or scabrid and corollas externally tomentulous on the tube and pilose-setose on the lobes. In view of these fundamentally different pubescent types and to maintain consistency with taxonomic concepts in Mexican and Central American *Arachnothryx*, Williams's variety is here elevated to the species level as *A. armentalis*, the earliest available epithet. Furthermore, *A. ovandensis* is here proposed as a synonym of *A. armentalis*. This species is closely related to *A. buddleioides* (Benth) Planchon, which differs in having leaves

adaxially smooth and glabrous or at first sparsely arachnoid-tomentose and soon glabrescent, inflorescences mostly longer than the subtending leaves, and corolla lobes externally arachnoid-tomentose but lacking pilose-setose trichomes. *Arachnothryx armentalis* occurs in Mexico (Oaxaca, Chiapas) and Guatemala in mesic and cloud forests at 1100–1700 m in elevation.

Representative specimens examined. MEXICO. **Oaxaca:** Sierra Mazateca, Mun. Huautla de Jiménez, alrededores del Puente de Fierro en dirección a Sta. María Chilchotla (7 km de Huautla de Jiménez por la carretera a Teotitlán–Mex 182), Munn-Estrada & Mendoza 1294 (PTBG). **Chiapas:** from El Triunfo to El Pavál, S slopes of Sierra de Soconusco, Xolocotzi & Sharp X. 489 (MO). GUATEMALA. **San Marcos:** above Finca el Porvenir on "Todos Santos Chiquitos", lower S-facing slopes of Volcan Tajumulco, Steyermark 37096 (F).

3. *Arachnothryx hondurensis* (Donnell Smith) Lorence, comb. nov. Basionym: *Rondeletia hondurensis* Donnell Smith, Bot. Gaz. (Crawfordsville) 27: 335. 1899. *Javorkaea hondurensis* (Donnell Smith) Borhidi & J. Komlódi, Acta Bot. Hung. 29: 16. 1983. TYPE: Honduras. Santa Bárbara: Río Chamelecón, 300 m, Dec. 1888, C. Thieme 5267 (holotype, US 943502; isotypes, F, US [2]).

The segregate genus *Javorkaea* (Borhidi & Járαι-Komlódi, 1983) was described to accommodate *Rondeletia hondurensis* Donnell Smith, a species endemic to Honduras and recognized by Standley (1918) as comprising the monospecific but never validly published section *Hondurenses* Standley of *Rondeletia*. *Javorkaea* was characterized similarly to Standley's *Hondurenses* by 1- to 3-lobed stipules with well-developed sheaths, 1- to 3-storied inflorescences, a 4- to 7-merous calyx, a large, slightly zygomorphic 5-merous corolla with lobes puberulent basally within, a subcapitate and bilobed stigma, a glabrous nectary disc, 4-colporate pollen, oblong hypanthium and capsule, capsule dehiscence at first loculicidal then septicidal and separating at base, and seeds as in *Arachnothryx* (Borhidi & Járαι-Komlódi, 1983). The subcapitate, shortly bilobed stigma and 4-colporate pollen grains are distinctive at the species level but fail to provide sufficient basis for recognition at the generic level (Lorence, 1991).

Subsequently, Borhidi (1997a, 1997b) transferred to *Javorkaea* six Mesoamerican species, two from *Rondeletia* and four that he had previously placed in *Arachnothryx*: *A. chaconii* (Lorence) Borhidi [as *chaconis*], *A. macrocalyx* (Standley & Steyermark) Borhidi, *R. megalantha* Lorence, *R. scabra*

Hemsley, *A. torresii* (Standley) Borhidi, and *A. uxpanapensis* (Lorence & Castillo-Campos) Borhidi. These species all display relatively large white or yellow corollas, puberulent around the mouth of the tube and basally on the lobes within, but are not otherwise closely related to *Arachnothryx hondurensis* except for their large flowers, which may represent an adaptation for moth pollination. Recently, Borhidi (2003) described a new species, *Javorkaea pulcherrima* Borhidi, from Chiapas, Mexico. Based on an examination of the isotype (Heath & Long 881, PTBG) this last species name is clearly synonymous with *Arachnothryx jurgensenii* (Hemsley) Borhidi. The addition of these seven species radically changes the original circumscription of *Javorkaea* sensu Standley's section *Hondurenses*, rendering it a heterogeneous assemblage of large-flowered shrubs or small trees differing in no consistent character or suite of characters from the majority of species otherwise placed in *Arachnothryx*.

The primary characters used to differentiate *Javorkaea*, i.e., the relatively long stipular sheath and calyx cup, 1- to 3-aristate stipules, zygomorphic calyx, large corolla with basally puberulent lobes within, and oblong hypanthium and capsule (Borhidi, 2003), occur in various combinations in other species of *Arachnothryx*, thus representing extremes in a continuum of variation rather than unique discrete character states. For these reasons, *Javorkaea* is here considered as a synonym of *Arachnothryx* and the necessary combination is made below for *R. megalantha*. Borhidi (2004: 101) similarly conceded that it was not possible to maintain *Javorkaea* and transferred *Rondeletia scabra* Hemsley (*Javorkaea scabra* (Hemsley) Borhidi) to *Arachnothryx*.

4. *Arachnothryx megalantha* (Lorence) Lorence, comb. nov. Basionym: *Rondeletia megalantha* Lorence, Novon 4: 132. 1994. *Javorkaea megalantha* (Lorence) Borhidi, Acta Bot. Hung. 40: 16. 1996–1997. TYPE: Honduras. Cuyamel, 23 Aug. 1924, M. A. Carleton 653 (holotype, US 1208409; isotype, US).

See the discussion under *Arachnothryx hondurensis*, above.

5. *Rogiera standleyana* (A. R. Molina) Lorence, comb. nov. Basionym: *Rondeletia standleyana* A. R. Molina, Ceiba 1: 262. 1951. *Arachnothryx standleyana* (A. R. Molina) Borhidi, Acta Bot. Hung. 33: 302. 1987. TYPE: Honduras. Morazán, in pine forest above Zambrano, 1200 m, 20 July 1949, L. O. Williams & A. Molina R. 14417 (holotype, EAP not seen; isotypes, F, US [2]).

Based on its pentamerous flowers and corolla with internally densely yellow-barbate lobes and throat *Rondeletia standleyana* clearly belongs to *Rogiera* (see generic key above), not *Arachnothryx* to which Borhidi (1987) incorrectly assigned it. *Rogiera standleyana* is closely related to *R. nicaraguensis* (Oersted) Borhidi, which differs by its leaves with the lamina adaxially hirtellous-pilosulous and abaxially strigillose and stipules 4–5 mm long, in contrast to being villous on both surfaces and with stipules only 1–3 mm long in *R. standleyana*.

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